UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/663,476	09/15/2003	Jong-Arm Jun	3364P136	3747

8791 7590 11/26/2007

BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER	
WONG, XAVIER S	

ART UNIT	PAPER NUMBER
2616	

MAIL DATE	DELIVERY MODE
11/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/663,476	JUN ET AL.	
	Examiner	Art Unit	
	Xavier Szewai Wong	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9th October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

- Applicant's Amendment filed *9th October 2007* is acknowledged
- Claims **1**, **6**, and **9** have been amended
- Claims **1-10** are still pending in the present application
- This action is made FINAL

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. **KR 2002-13079**, filed on *5th October 2007*.

Claim Objections

2. Objection to claim **9** has been withdrawn after amendment.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims **6** and **8** are rejected under 35 U.S.C. 102(e) as being anticipated by **Chao et al** (**U.S Pat 6,667,984 B1**).

Consider claim **6**, **Chao et al** disclose an arbitration method of a matrix switch including a plurality of input ports (fig. *9* items *910*), crosspoint/crossbar switch units (col. *18* lines *35-40*; fig. *13* items *926*), a buffer (col. *18* lines *42-44*; fig. *13* sect. *1304*), and output ports (fig. *9* items *930*) comprising:

(a) a grant arbiter of the crosspoint unit selects (inherently after searching) a winning first-requested request from input signals of the input ports (col. *18* lines *18-23*; fig. *11* items *1110* & *1120*)

(b) input arbiter sends request to output/grant arbiter to determine whether a (additional) head-of-line cell of a VOQ buffer can be granted for output at output port (col. *16* lines *12-13*/*34-45*; col. *20* lines *31-46*); further, **Chao et al** teach arbitration via token (credit) tunneling, which is each output port selects (accept) one winner among requesting arbitration input ports, which is in each arbitration round, a token (credit information) will be passed to a specific column (leading to a specific output port) when a multicast bit is HIGH ("1") (col. *22* lines *11-28*; col. *23* lines *42-44*) and eventually to an output port associated with the one (individual) crosspoint column (col. *22* lines *39-49*; col. *24* lines *3-17*); therefore, using credit token to determine whether grant arbiter can received more cells for the specified output port

(c) output arbiter sends grant signal to input/accept arbiter when a cell is buffered (col. *16* lines *56-57*; col. *18* lines *16-23*)

(d) input arbiter (as accept arbiter) of crosspoint unit perform arbitration to select a (first) grant signal from a multiple set of grant signals (col. *16* lines *57-59*; fig. *9* item *920*)

(e) input arbiter sends accept signal to winning output according to grant signal (col. *16* lines *59-60*)

Consider claim **8**, and as applied to claim **6**, **Chao et al** further disclose the utilization of *dual* Round Robin to selecting/searching winning (therefore, highest priority) value in grant, accept and output arbitrations in steps *a*, *d* and *f* (col. *16* lines *22-33*; fig. *11* items *1110,1120*; *abstract*).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims **1 – 3** are rejected under 35 U.S.C. 103 (a) as being unpatentable over **Chao et al** (**U.S Pat 6,667,984 B1**) in view of **Nong** (**US 2003/0123469 A1**).

Consider claim **1**, **Chao et al** disclose a matrix switch *900* (fig. *9*) comprising: N input ports/groups *910* with a number of VOQs *912* (col. *15* lines *48-50*; col. *16* lines *7-8*); inputting into crosspoint/crossbar chips *924* (fig. *30*) and independently arbitrating input VOQ groups, and output cells (col. *16* lines *35-37*; fig. *10* item *1010*; fig. *11* items *910* & *1110*); as well as N output ports *930* for independently arbitrating cells output from the crosspoint chips *924* and transmitting cells to output ports (col. *15* lines *51-57*; col. *16* lines *18-22/31-33*; fig. *10* item *1030*; fig. *11* item *1120*). **Chao et al** further disclose arbitration via token (credit) tunneling, which is each output port selects (accept) one winner among requesting arbitration input ports, which is in each arbitration round, a token (credit information) will be passed to a specific column (leading to a specific output port) when a multicast bit is HIGH ("1") (col. *22* lines *11-28*; col. *23* lines *42-44*) and eventually to an output port associated with one (individual) crosspoint column (col. *22* lines *39-49*; col. *24* lines *3-17*); therefore, independently arbitrating cells. However, **Chao et al** may not have explicitly disclosed each crossbar switch unit includes a buffer storing a predetermined sized cell. **Nong** discloses each crossbar is internally buffered wherein

each buffer holds two-cell (predetermined) size packet (paragraph *0004* lines *7-10*). It would have been obvious to one of ordinary skill in the art to apply the predetermined size cell to the crosspoint/crossbar switch units of **Chao et al**, as modified by **Nong**, for reducing overhead.

Consider claim **2**, and as applied to claim **1**, **Chao et al**, as modified by **Nong**, show the crosspoint units *926* in figure *14A* form a plurality of switch planes/modules *922* in figure *9* (col. *15* lines *54-57*); the switch module comprises output port that include buffer for storing predetermined cell in the output port (col. *16* lines *6-9*; col. *18* lines *40-49*; fig. *13* sect. *1304*).

Consider claim **3**, and as applied to claim **1**, **Chao et al**, as modified by **Nong**, disclose a switch size of "N" and "n" number of ports in each crosspoint chip/crossbar switch units; for an NxN switch (N^2) and nxn (n^2) crosspoint chips when $L^2 = N^2/n^2$, therefore, L = N/n (all natural numbers), which is the size of a group (col. *17* lines *5-10*; fig. *9* & *30*). As an example, from figure *9*, assume there are 4 groups of VOQs *910a-d*, 4 switch modules (large squares inside *922a*), and within each switch module, there are 4 crosspoint/crossbar switch units; and therefore, L = 4.

7. Claim **4** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al** (**U.S Pat 6,667,984 B1**) in view of **Nong** (**U.S Pub 2003/0123469 A1**), as applied to claim **3**, and in further view of **Wang et al** (**U.S Pub 2004/0083326 A1**).

Consider claim **4**, and as applied to claim **3**, **Chao et al**, as modified by **Nong**, disclose *n = 4* output and input arbiters (with grant and accept capabilities respectively – col.

16 lines *46-60*) for 4 groups of input ports, each with *n* = *4* VOQs in figure *11* and crosspoint units are controlled by input/output port controllers (col. *20* lines *21-33*). However, **Chao et al** did not explicitly disclose the grant arbiter receives n-bit request signal vector from VOQ and transmits an n-bit grant signal vector to the accept arbiter; and the accept arbiter receives the n-bit grant signal vector, and transmits an n-bit accept signal vector to the crossbar switch controller. **Wang et al** disclose in figure *3* a group of VOQs sending N-bit request (signal) vector to a grant arbiter inside a scheduler (as controller) of a crossbar switch and an N-bit grant (signal) vector to an accept arbiter (paragraphs *0047* lines *1-16* & *0050*; *abstract*); the accept arbiter then transmit the N-bit accept vector to decision register (paragraph *0048*; fig. *4*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings as taught by **Wang et al**, in the matrix switch of **Chao et al**, as modified by **Nong**, for achieving the same goal.

8. Claims **5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al** (**U.S Pat 6,667,984 B1**) in view of **Nong** (**U.S Pub 2003/0123469 A1**) and **Wang et al** (**U.S Pub 2004/0083326 A1**), as applied to claim **4**, and in further view of **Van Wageningen et al** (**U.S Pub 2002/0150121 A1**).

Consider claim **5**, and as applied to claim **4**, **Chao et al**, as modified by **Nong** and **Wang et al**, disclose both input and output controls comprise queue(buffer) management process (fig. *12* item *1250*; fig. *15* item *1520*) to send request signals to output arbitration/arbiter when a cell is in line in figure *11* item *1120* (col. *20* lines *9-24*). However, **Chao et al** may not have explicitly mention the output arbiter sending an

accept signal to a selected crossbar switch unit. **Van Wageningen et al** disclose an output arbiter accepts inquiries from a switching controller in a switch matrix and routes/sends an identifier to inform acceptance (paragraphs *0035* & *0043*; figs. *3* & *4*; *abstract*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings of an output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen et al**, in the method of **Chao et al**, as modified by **Nong** and **Wang et al**, for determining queue priority.

9. Claims **7** and **9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al** (**U.S Pat 6,667,984 B1**) in view of **Van Wageningen et al** (**U.S Pub 2002/0150121 A1**).

Consider claim **7**, and as applied to claim **6**, **Chao et al** disclose output arbitration/arbiter process for each output port uses the crosspoint units to select the winning (highest priority) "first" request signal (col. *17* lines *39-55*). However, **Chao et al** may not have explicitly mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen et al** disclose an output arbiter accepts inquiries from a switching controller in a switch matrix and routes/sends an identifier to inform acceptance (paragraphs *0035* & *0043*; figs. *3* & *4*; *abstract*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings of an output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen et al**, in the method of **Chao et al** for determining queue priority.

Consider claim **9**, and as applied to claim **8**, **Chao et al** further disclose updating (new/greater) highest priority of selected output port from input arbitration/arbiter (as accept arbiter) based on a grant signal as well as updating crosspoint units on highest priority and stores values in a column priority value register – CPR (col. *16* lines *41-57*; col. *31* lines *40-63*; col. *32* lines *60-67*). However, **Chao et al** may not have explicitly mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen et al** disclose an output arbiter accepts inquiries from a switching controller in a switch matrix and routes/sends an identifier to inform acceptance (paragraphs *0035* & *0043*; figs. *3* & *4*; *abstract*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings of an output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen et al**, in the method of **Chao et al** for determining queue priority.

10. Claim **10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al** (**U.S Pat 6,667,984 B1**) in view of **Van Wageningen et al** (**U.S Pub 2002/0150121 A1**), as applied to claim **9**, and in further view of **McKeown** (*"The iSLIP Scheduling Algorithm for Input-Output Switches"*).

Consider claim **10**, and as applied to claim **9**, **Chao et al**, as modified by **Van Wageningen et al**, disclose the claimed invention except explicitly mentioning an accept arbiter updating a preset highest priority ranking value by adding 1 to output port information matched with a grant signal, and the accept arbiter updating the highest priority ranking adding 1 to input port information and crossbar switch unit information

corresponding to an accept signal. **McKeown** disclose an accept arbiter increments by one a (preset) highest priority (ranking) value with pointers g_i (grant) and a_i (accept) to an output matched with a grant signal; also to input and a crossbar switch unit (pg. *199* left-col. *steps 2 & 3* in *IX. Implementing iSLIP*; pg. *196* left-col. steps *2 & 3*; fig. *20 & 21*). It would have been obvious to one of ordinary skill to incorporate the teachings as taught by **McKeown**, in the method of **Chao et al**, as modified by **Van Wageningen et al**, for achieving the same goal.

Response to Arguments

11. Applicant's arguments with respect to claims **1** and **6** have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, this action is made Final. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xavier Wong whose telephone number is 571-270-1780. The examiner can normally be reached on Monday through Friday 8:30 am - 6:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Xavier Szewai Wong
X.S.W / x.s.w
13th November 2007

Seema S. Rao 11/2-1/07
SEEMA S. RAO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600